BOARD REVIEW QUESTIONS:
AORTIC VALVE DISEASE

MARTIN G. KEANE, MD, FASE
PROFESSOR OF MEDICINE
LEWIS KATZ SCHOOL OF MEDICINE, TEMPLE UNIVERSITY

ASCeXAM/ReASCE REVIEW COURSE
The most comprehensive review to help you prepare for the NBE certification examinations.
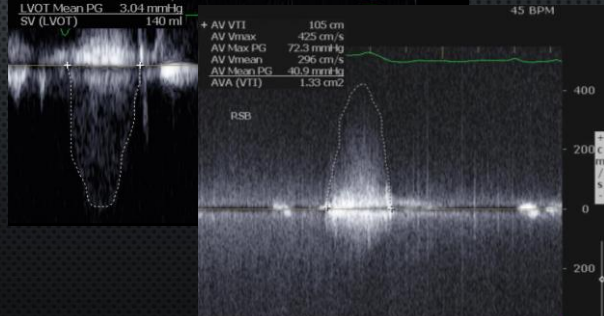ANNUAL 19th

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BOARD REVIEW Q#1 – 65 Y/O M w/SOB, EASY FATIGUE

- POORLY-CONTROLLED DM, HTN, ↑LIPIDS, OSA AND OHS
- 140/70, 5'8" (1.7M), 383LB (173.7KG), BMI=60 KG/M^2
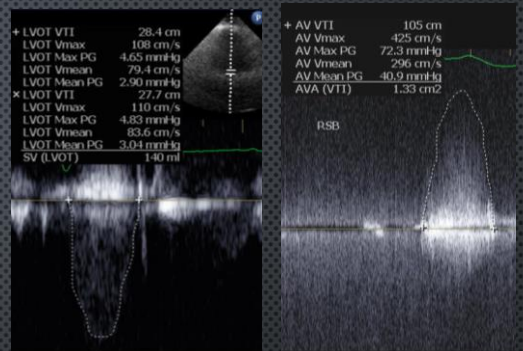- ↓S2 SINGLE; 3/6 LATE-PEAK MURMUR→ CAROTIDS

LVOT diameter = 24 mm

+ LVOT VTI	28.4 cm
LVOT Vmax	108 cm/s
LVOT Max PG	4.65 mmHg
LVOT Vmean	79.4 cm/s
LVOT Mean PG	2.90 mmHg
× LVOT VTI	27.7 cm
LVOT Vmax	110 cm/s
LVOT Max PG	4.83 mmHg
LVOT Vmean	83.6 cm/s
LVOT Mean PG	3.04 mmHg
SV (LVOT)	140 ml

+ AV VTI	105 cm
AV Vmax	425 cm/s
AV Max PG	72.3 mmHg
AV Vmean	296 cm/s
AV Mean PG	40.9 mmHg
AVA (VTI)	1.33 cm2

RSB

47 BPM
45 BPM

ECHO – AV DATA SUMMARY

- PEAK VELOCITY –   4.3 M/SEC
- MEAN GRADIENT –   41 MMHG
- CALCULATED AVA –   1.2 CM^2
- AVA$_{INDEX}$ –   0.5 CM^2/M^2
- DIMENSIONLESS INDEX –   0.27

HOW DO YOU INTERPRET THIS DATA?
1. MILD AS –   BECAUSE LVOT VTI OVERESTIMATED
2. MILD AS –   BECAUSE LVOT DIAM OVER-MEASURED
3. MODERATE AS –   BASED ON VALVE AREA
4. SEVERE AS –   BASED ON PV, MG, INDEXED AREA
5. CANNOT DETERMINE –   POOR DATA QUALITY

BOARD REVIEW Q#1 – 65 Y/O M w/SOB, EASY FATIGUE

WHAT DO YOU RECOMMEND?

1. HIGH RISK AVR

2. MEDICAL MANAGEMENT

3. DOBUTAMINE STRESS ECHO

4. LEFT AND RIGHT HEART CATHETERIZATION

5. REFERRAL TO BARIATRIC SURGERY PROGRAM

RHC
- RA 16
- RV 58/17
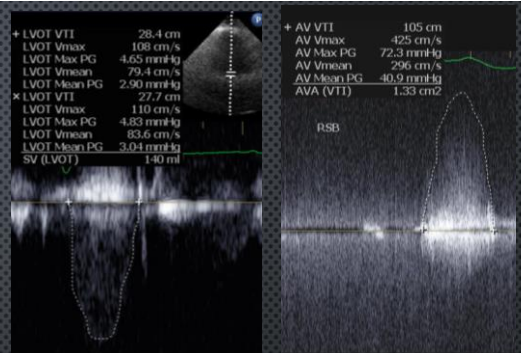- PA 59/18/37
- PWCP 27
- LVEDP 37
- CO 5.2   CI 1.9

LHC
- AV -   MG 42 mm Hg, AVA 0.98 cm^2
- CORONARIES
  - LM =   NO SIG. DISEASE
  - LAD =   80-90% STENOSIS AFTER D1
  - LCx =   PROX 30%, OM1 99 %, OM2 100%
  - RCA =   MID 30 %

WHAT DO YOU RECOMMEND NOW?
1. HIGH RISK AVR + CABG X2
2. TAVR + MULTIVESSEL PCI
3. TREADMILL STRESS TEST
4. MEDICAL MANAGEMENT FOR NOW
5. REFERRAL TO BARIATRIC SURGERY PROGRAM

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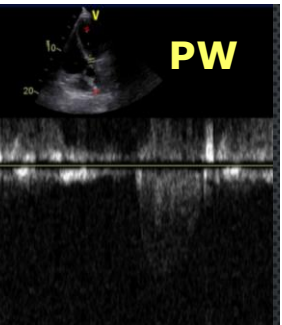
BOARD REVIEW Q#2 – 38 Y/O M, ↓↓EX. TOLERANCE

- Avid biker: 1 yr ↓tolerance – DOE, dizziness, fatigue
- Coarct of Ao (patch repair 17 mo), Bicuspid AoV
- Phys. Exam
  - 118/70; 5'9" (1.8m), 176lb (79kg), BMI=26 kg/m²
  - 3/6 SEM w/preserved S2

BOARD REVIEW Q#2 – 38 Y/O M, ↓↓EX.

PW
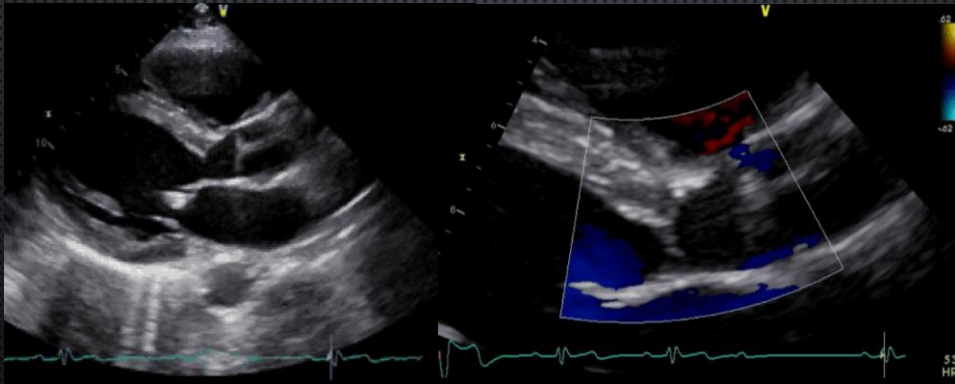
LVOT Vmax	2.53 m/s
LVOT Vmean	1.86 m/s
LVOT maxPG	25.63 mmHg
LVOT meanPG	15.24 mmHg
LVOT Env.Ti	293 ms
LVOT VTI	54.6 cm

CW

AV Vmax	2.85 m/s
AV Vmean	2.00 m/s
AV maxPG	32.45 mmHg
AV meanPG	17.89 mmHg
AV Env.Ti	304 ms
AV VTI	61.0 cm
÷	0.02 m/s
p	0.00 mmHg

Dimensionless Index = 0.89

BOARD REVIEW Q#2 – 38 Y/O M, ↓↓EX. TOLERANCE

WHAT IS THE DIAGNOSIS?

1. BICUSPID AORTIC STENOSIS

2. HYPERTROPHIC CMP W/LVOT OBSTRUCTION

3. SUBVALVULAR LVOT OBSTRUCTION

4. THE DI IS 0.89 – THERE IS NO OBSTRUCTION

5. NEED MORE INFORMATION

MID LV/AO   LVOT/AO

BOARD REVIEW Q#2 – 38 Y/O M, ↓↓EX. TOLERANCE

WHAT DO YOU RECOMMEND?

1. RESECT SUBVALVULAR MEMBRANE

2. RESECT SUBVALVULAR MEMBRANE AND AV REPAIR

3. RESECT SUBVALVULAR MEMBRANE AND AV REPLACEMENT

4. BALLOON VALVULOPLASTY OF LVOT

5. DO NOTHING

BOARD REVIEW Q#3

WHAT CAN LEAD TO **UNDERESTIMATION** OF THE AORTIC VALVE PEAK GRADIENT ON ECHO AS COMPARED WITH INVASIVE HEMODYNAMICS:

1. PRESSURE RECOVERY

2. EQUATING PEAK INSTANTANEOUS GRADIENT TO "PEAK-TO-PEAK" GRADIENT

3. A LARGE INCIDENT ANGLE TO THE AORTIC OUTFLOW

4. FAILURE TO ACCOUNT FOR HIGH SUBVALVULAR FLOW

5. LOW STROKE VOLUME

BOARD REVIEW Q#3
ECHO AOV PG VS. CATH/HEMO AOV PG

A. PRESSURE RECOVERY –
   ECHO PG HIGHER

B. EQUATING PEAK INSTANTANEOUS GRADIENT (ECHO) TO "PEAK-TO-PEAK" (HEMODYNAMIC) GRADIENT -
   ECHO PG HIGHER

C. A LARGE INCIDENT ANGLE TO THE AORTIC OUTFLOW –
   ECHO PG MIS-MEASURED LOWER

D. FAILURE TO ACCOUNT FOR HIGH SUBVALVULAR FLOW –
   BOTH ECHO AND HEMO PG'S ELEVATED

E. LOW STROKE VOLUME –
   BOTH ECHO AND HEMO PG'S LOWER

BOARD REVIEW Q#4: 85 Y/O WOMAN W/DOE + CP

- H/O "MILD" AS. HYPOXIC ON RM AIR, 2+ PITTING EDEMA
  - 3/6 MID-LATE PEAKING SEM RADIATING TO NECK

- CARDIAC CATH
  - RA = 16, RV = 97/19, PA 93/27 (53), PCWP = 22, CI 1.5 L/MIN/M^2
  - ARTERIOGRAPHY – MINIMAL LUMINAL IRREGULARITIES

BSA = 2.14 Sv_i = 28 ml

AVA by CE:
0.8 cm^2
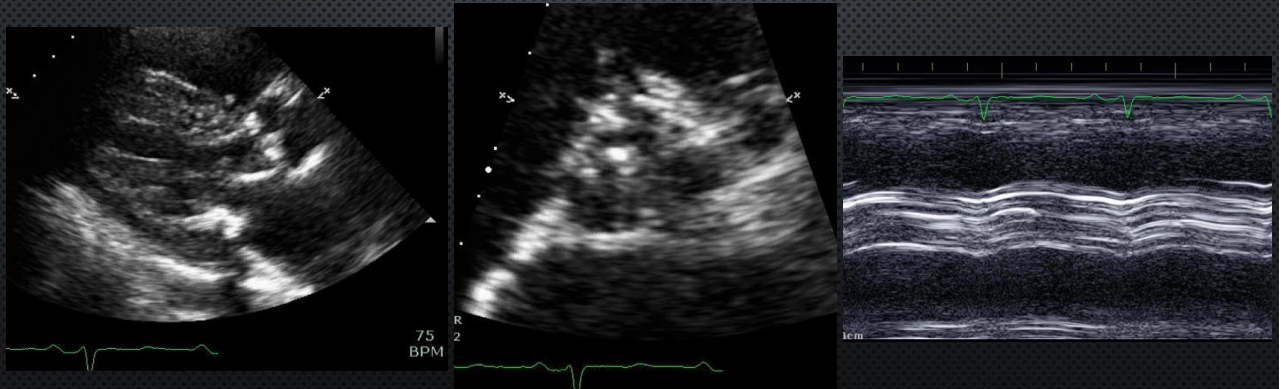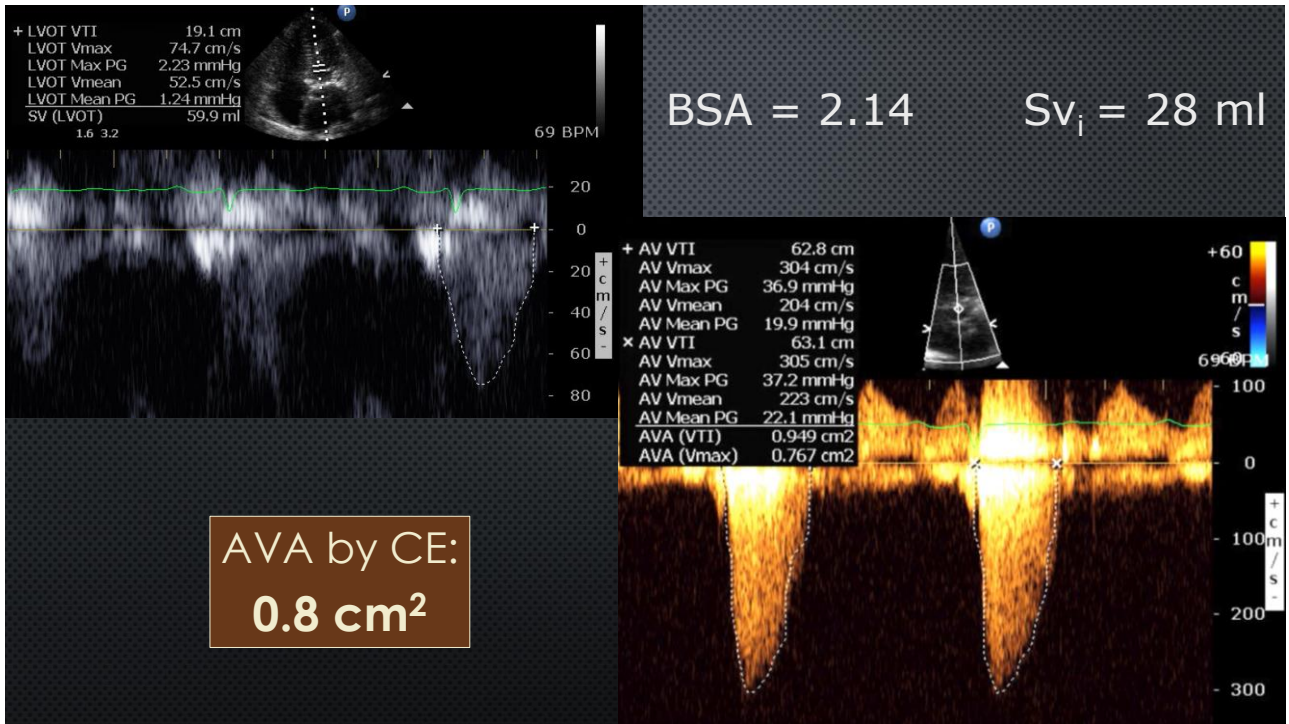
BOARD REVIEW Q #4

MEAN GRADIENT <40 MMHG MEANS:

1. THIS IS DEFINITELY NOT SEVERE AS

2. THE GRADIENT IS LOW BECAUSE THERE IS DEPRESSED LV EJECTION FRACTION

3. THE GRADIENT IS LOW BECAUSE THE CW DOPPLER WAS MIS-MEASURED

4. THE GRADIENT IS LOW BECAUSE OF LOW STROKE VOLUME

5. AS LONG AS CALCULATED AVA IS 0.8 CM^2, THE MEAN GRADIENT DOESN'T MATTER.

LOW GRADIENT AS:
THERE'S A LOT TO THINK ABOUT!!

- **LOW STROKE VOLUME (SV$_I$)**
  - *DEPRESSED EF*
  - *PRESERVED EF –*
    - TINY VENTRICLE
    - IMPAIRED FILLING
    - SEVERE MR
    - IMPAIRED RV OUTPUT

- **INCREASED VASCULAR AFTERLOAD**

BOARD REVIEW Q #4

IN THIS CASE, THE BEST NEXT STEP FOR DIAGNOSIS IS:

A. NO FURTHER WORKUP IS NEEDED.

B. TREADMILL STRESS TESTING W/ECHO ASSESSMENT OF AV AT PEAK STRESS.

C. DOBUTAMINE STRESS ECHOCARDIOGRAPHY WITH STAGED ASSESSMENT OF SV, AVA AND GRADIENTS

D. TEE ASSESSMENT OF AORTIC VALVE MORPHOLOGY AND PLANIMETRY

E. PULMONARY FUNCTION TESTING TO EVALUATE LUNG DISEASE AS AN ETIOLOGY FOR SYMPTOMS
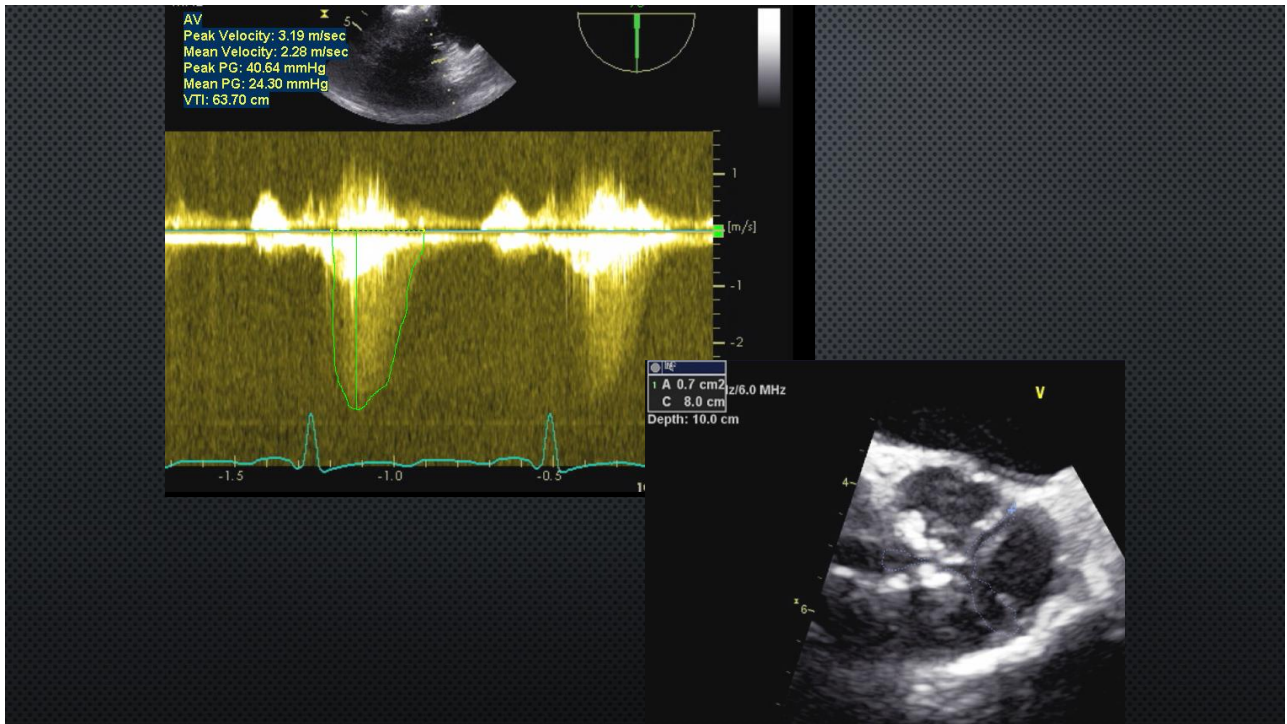
BOARD REVIEW Q #5

A PATIENT PRESENTS WITH THE FOLLOWING ECHO FINDINGS:

LVOT DIAMETER   **=**   **2.0 CM**
LVOT VELOCITY   **=**   **130 CM/S**
AORTIC VELOCITY   **=**   **4.1 M/S**

2D: MODERATELY CALCIFIED AV, NORMAL LVEF (70%)

THE AORTIC VALVE AREA IS MOST LIKELY:

1. NORMAL
2. MILDLY REDUCED
3. MODERATELY REDUCED
4. SEVERELY REDUCED
5. CANNOT BE CALCULATED (INCONGRUENT UNITS)

DI = 130/410

DI = 0.32

BOARD REVIEW Q #5

Table 3 Recommendations for classification of AS severity

	Aortic sclerosis	Mild	Moderate	Severe
Aortic jet velocity (m/s)	≤2.5 m/s	2.6–2.9	3.0–4.0	>4.0
Mean gradient (mmHg)	–	<20 (<30[a])	20–40[b] (30–50[a])	>40[b] (>50[a])
AVA (cm^2)	–	>1.5	1.0–1.5	<1.0
Indexed AVA (cm^2/m^2)		>0.85	0.60–0.85	<0.6
Velocity ratio		>0.50	0.25–0.50	<0.25

[a]ESC Guidelines.
[b]AHA/ACC Guidelines.

Thank You!